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NPIC/D-171-70

10 JUN 1970

MEMORANDUM FOR: Assistant Deputy Director for Intelligence *Exp*SUBJECT : Request for Approval of a Contract for a
Color Standard Project with [redacted]
[redacted] from FY-1970 Funds25X1
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1. This memorandum requests approval for the commitment of R&D funds for a NPIC contract. The specific request is stated in paragraph 9.

2. The advent of high definition color film as an operational acquisition material has necessitated the development of color image evaluation standards and techniques. Methods and equipment suitable for analysis of black and white imagery require extension and modification before they may be applied to color imagery. For certain more routine functions, e.g. chemical process control and film exposure requirements, standard operating conditions and instrumentation have already been established. This is not the case for applications such as the determination of object color from measurements made on the fine detail of color imagery, the measurement of color modulation transfer function and power spectral density, micro-image resolution, and other color image quality parameters. In addition, the response of color film layers during the scanning operation in digital image manipulation must be quantitatively determined.

3. As a prerequisite to making any of the measurements mentioned above, standard instrumentation and data collection techniques must be developed. For image evaluation and manipulation applications, most of the data required can be collected by an instrument called a microdensitometer. Because the measurements made are concerned with image areas on the order of several microns (millionths of a meter) the microdensitometer itself must be calibrated extremely accurately so that variations in its output data can be assigned the proper cause, i.e. electrical, mechanical, optical or photographic.

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4. Currently, a microdensitometer for measuring black and white and color film is available in Applied Photo-Science Division (APSD). This instrument was designed in 1965 for use with materials then available. While an excellent instrument for black and white image analysis, precalibration experiments on current color imagery have shown that (1) new optics will be required and (2) electronic, mechanical, and optical calibration standards must be developed. As currently designed the objective lenses on the microdensitometer do not have adequate depth of field to focus the three images in a single image position as required. As a consequence, the output data are dependent upon, rather than independent of, the focus position. The situation is analogous to an improperly focused color TV set where color fringing can be observed and the objects are obviously not correctly reproduced. After the microdensitometer has been properly calibrated, quality control procedures are necessary to assure proper day-to-day operation.

5. The proposed contract with [redacted] is designed to overcome the problems discussed above. It will be executed in three overlapping phases during a nine-month period. Phase one will be concerned with acquisition and calibration of new objective lenses. Phase two will involve electronic, mechanical and optical system calibration. The optics in this phase will include filters, mirrors, and condensers in concert with the new objective lenses. Phase three will be concerned with the application of the microdensitometer to color transfer function analyses, the formulation of quality control procedures, and the preparation of a color microdensitometer handbook. This handbook will spell out in detail the procedures for use of the instrument and the techniques for analyzing the data collected. Monthly and final reports, the quality control film standards, and the Handbook constitute the deliverable items.

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6. [redacted] has been selected as the sole source for this project because of their intimate knowledge of the [redacted] microdensitometer (they installed it originally), and their extensive experience with micro image quality assessment on both black and white and color films. Accordingly, the risk associated with the calibration portion of the project is very low. The adequacy of the objective lenses, however, cannot be determined in detail before the other variables are pinned down. Consequently, the risk involved here is somewhat greater: contingency plans for the redesign or modification of the objectives have been made.

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7. Follow-on action is anticipated in the development of more advanced and sophisticated color imagery analysis techniques. The level of such follow-on action cannot now be estimated and will not necessarily be with the same contractor. This project has been coordinated with APSS.

8. The sterility Code, [redacted] is appropriate; the project officer, [redacted] will assign security classification to the individual reports.

9. It is requested that the negotiation with [redacted] for a contract to conduct the program described at a cost not to exceed [redacted] be approved.

ARTHUR C. LUNDAHL
Director
National Photographic Interpretation Center

Attachments:

1. Proposal
2. Form 2420

APPROVED: [redacted] 12 JUN 1970
Assistant Deputy Director for Intelligence Date

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- Original - NPIC/TSSG/SC&PS (After Approval)
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